

4A COMMUNICATION SYSTEM

(COM KEY * 416)

1. GENERAL

- 1.01 This document supplements Section 518-450-105, Issue 1.
- 1.02 This supplement is issued to provide identification, installation, connection, and testing information for the following:
- . 24A apparatus unit (power failure ringer adjunct).
 - . 25A apparatus unit (supplementary alerting device interface)
 - . 26A apparatus unit (preset multiple voice signaling)
 - . 109A loudspeaker set (wall speakers)

NOTE: Information on the 27A apparatus unit (customer-owned and maintained) was not available at the time of printing. Identification, installation, connection, and testing information will be packed with the units. Issue 2 of this BSP will include information on all vertical services.

2. IDENTIFICATION

24A APPARATUS UNIT

2.01 The 24A apparatus unit (Figures 1 and 2) is a power failure ringer adjunct for the COM KEY 416 system. One apparatus unit is required for each primary set. Each unit monitors the power supply of the primary set. In the event of a power failure, ringing is provided by two C4A ringers that are connected across the respective telephone lines.

25A APPARATUS UNIT

2.02 This unit (Figures 3, 4, and 5) is a supplementary alerting device interface adjunct. It provides circuitry to accept an input from one designated direct station selection (DSS) button and/or any combination of four common audible leads to provide an output capable of driving a dc relay for ringing bells, horns, etc.

26A APPARATUS UNIT

2.03 This unit (Figures 6, 7, and 8) provides preset multiple voice signaling which permits the customer to activate any combination of direct station select (DSS) addresses by depressing one designated DSS button. This feature is used for group signaling, emergency, etc.

*

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109A LOUDSPEAKER SET

2.04 The loudspeaker set (Figures 9, 10, and 11) includes speaker, amplifier, and two volume controls in a wood housing designed for wall mounting. They are intended for typical indoor business offices and not outside or high noise level environments. Customer-accessible individual volume controls are provided for background music level (right control) and page level (left control).

ORDERING GUIDE

- 2.05 . 24A apparatus unit
- . 25A apparatus unit
- . 26A apparatus unit
- . Set, loudspeaker, 109A
- . Block, connecting, 91A (if required)
- . Coupler, voice 33A (if required)

3. INSTALLATION

PLANNING

- 3.01 The apparatus units are to be mounted at a location where convenient access to the cabling system is provided.
- 3.02 The following precautions are to be considered as to location of installation:
 - (a) The 24A apparatus unit is to be located near any telephone set where this feature is required.

R This apparatus unit must be mounted on a vertical surface
E so that the mercury relay (Figure 2) on the printed wiring
A board is in a vertical position as indicated on the relay
D can.
 - (b) The 26A apparatus unit is to be installed in indoor location (above 32°F.
 - (c) The 109A loudspeaker is designed for indoor locations (above 32°F). Speakers reach a depth of 30 feet. If a room is over 30 feet wide, facing speakers should be used.

NOTE: Care shall be taken in location of speaker(s) to avoid feedback when paging from nearby stations. Spacing of up to 30 feet may be required between the speaker(s) and station sets.

24A APPARATUS UNIT

3.03 Install the 24A apparatus unit as follows:

- (1) Remove the cover and mount the base pan assembly (Figure 2) on the desired vertical location (use appropriate fastener per BSP 080-720-105).
- (2) Remove the cable clamp or clamps (Figure 2).
- (3) Insert system cable or cables (Figure 2).
- (4) Replace the cable clamp or clamps using the tapped hole in the base pan or standoff to hold the cable securely.
- (5) For connections, see paragraph 4.01.
- (6) Replace the housing.

3.04 Test as follows:

- (1) Unplug the ac line cord of the primary set serving CO/PBX lines 1 and 2. From any set, dial CO/PBX line 1. The power failure ringers shall ring. Repeat for CO/PBX line 2.
- (2) Hang up the calling set.
- (3) Plug the ac line cord back into the ac receptacle.
- (4) From any set dial CO/PBX line 1, then line 2, the power failure ringers shall not ring.
- (5) If a second 24A apparatus unit is connected, use the same procedure on CO/PBX lines 3 and 4.

R
E
A
D
Be certain the ac line cord of each primary set is securely plugged back into its receptacle after completing these tests.

25A APPARATUS UNIT

3.05 Install the 25A apparatus unit as follows:

- (1) Remove the cover and mount the base pan assembly (Figures 4 and 5) at the desired location (use appropriate fastener per BSP 080-720-105).
- (2) Mount the KS-16626 L12 relay set per BSP 463-120-100 or the KS-16301 L17 relay per BSP 463-110-100.
- (3) For connections, see paragraph 4.02.
- (4) Insert system cable or cables (Figure 4).
- (5) Position inserts (Figure 4) inside cover to hold cables securely when cover is replaced.
- (6) Replace cover.

3.06 Test as follows:

- (1) If the auxiliary signal is coded to respond to a DSS code, depress that DSS button at any station to operate the auxiliary signal. The signal will continue to operate as long as the button is depressed.

NOTE: The handset need not be removed nor does an intercom button have to be depressed.

- (2) If the auxiliary signal is coded to respond to common audible signal(s), call each of these lines from a station. The auxiliary signal shall follow the normal CO/PBX ringing pattern.

26A APPARATUS UNIT

3.07 Install the 26A apparatus unit as follows:

- (1) Remove the cover and mount the base (Figures 7 and 8) assembly on the desired location (use appropriate fastener per BSP 080-720-105).
- (2) For connections, see paragraph 4.03.
- (3) Insert system cable (Figure 7).
- (4) Position inserts (Figure 7) inside cover to hold cables securely in place when cover is replaced.
- (5) Replace the cover.

3.08 Test as follows:

- (1) At an idle telephone set, adjust the volume control to maximum and set the DSS selector switch to DSS code 1.

NOTE: The SPKR button must be in the released (up) position.

- (2) Select and depress an idle intercom (IC) line button. Depress and hold the DSS button corresponding to the input code of the 26A apparatus unit and speak into the handset. Speech shall be heard from the loudspeaker in the station set if the 26A apparatus unit is coded to access the zone coded in step (1).
- (3) Repeat steps (1) and (2), moving the DSS selector switch through the remaining DSS zones.

109 LOUDSPEAKER SET

3.09 Install the 109A loudspeaker as follows:

- (1) Mount the wall bracket assembly (Figure 10) on the desired location. This assembly is mounted directly to a flat surface or a device box. Use appropriate fasteners per BSP 080-720-105.

R For each loudspeaker installed, the total number of telephone
E sets per system (as covered in BSP 518-450-105, paragraph
A 3.02) must be reduced by a like number.
D

- (2) If music is provided, install the 33A voice coupler per BSP 418-450-105, paragraph 3.13.

NOTE: Only one 33A voice coupler is required in the system to provide music to all 109A loudspeakers and to the primary set(s) for music-on-hold.

- (3) For connections see paragraphs 4.04 and 4.05.
- (4) Connect plug A of loudspeaker into jack A of wall bracket assembly and plug B into jack B, ivory to ivory and gray to gray, respectively (Figure 11).
- (5) Slip the speaker baffle mounting bracket over the mounting clips on the wall bracket assembly and pull the speaker down until it is firmly held (Figure 11).

- 3.10 If background music is provided adjust the volume control of the 33A voice coupler to mid-range. Then, adjust the right-hand volume control(s) on the loudspeaker(s) to the desired music level (Figure 9). The volume control of the 33A voice coupler may be readjusted if necessary to raise or lower the overall music level.

R
E
A
D
If music-on-hold was previously furnished, do not adjust the level from the customer provided music source.

- 3.11 Test the loudspeaker as follows:

- (1) At any telephone set, depress an idle IC button and the DSS button that corresponds to the 109A loudspeaker set (if background music is provided it will be muted). Speak into the transmitter and adjust the volume control to the level desired by the customer (Figure 9).

4. CONNECTIONS

24A APPARATUS UNIT

- 4.01 The 24A is factory-wired (Figure 12) to provide power failure ringer service for CO/PBX lines 1 and 2. To connect the unit to lines 3 and 4, see Table A.

25A APPARATUS UNIT

- 4.02 Connect the 25A apparatus unit (Figure 13) as follows:

- (1) Connect the auxiliary signal and power supply to KS-16626, L12 relay set and/or KS-16301, L17 relay set per BSP 463-120-100 or BSP 463-110-100, respectively.

- (2) If the auxiliary signal is to respond to any one DSS code, move the spade-tip lead associated with that code from terminals DSS 1-10 to terminal IN (Figure 5).
- (3) If the auxiliary signal is to respond to any combination of common audible signals (CA 1 through 4), move the spade-tipped lead associated with that line and/or lines to the A through D terminals, respectively.

NOTE: The 25A apparatus unit may be coded to respond to both DSS codes and common audible signals.

4.03 Determine which DSS code that will be used to access the input for multiple signaling and which DSS codes are to be called simultaneously (Figure 14) and connect as follows:

- (1) Remove the lead corresponding to the input code from the numbered terminal (Figures 8 and 14) where it is stored; insert the lead in the IN terminal (Figures 8 and 14).
- (2) Remove the leads corresponding to the output codes and insert each lead in a separate terminal lettered A through J. (Figures 8 and 14).

NOTE: Selection of lettered terminals A-J are on a random basis, using only 1 DSS code per terminal. If possible do not use adjacent terminals; this will prevent the possibility of shorted terminals.

109A LOUDSPEAKER SET

- 4.04 Connect +V, COM, and DSS to jack A (ivory) of the wall bracket assembly (Figure 11) per Table B.
- 4.05 If music is provided, connect terminals 5 and 6 of the 33A voice coupler to terminals R and G of jack B (gray) of the wall bracket assembly (Figure 11) using inside wire.

TABLE A
24A APPARATUS UNIT
(CONNECTIONS FOR CO/PBX LINES 3 AND 4 ONLY)

REMOVE LEAD FROM*		CONNECT LEAD TO#	
LEAD COLOR	PRINTED WIRING BOARD TERMINAL	LEAD COLOR	PRINTED WIRING BOARD TERMINAL
BL-W	5*	O-R	5
W-BL	4*	R-O	4
BK-S	6*	Y-G	6
W-BR	9*	R-S	9
BR-W	7*	S-R	7

*INSULATE AND STORE AFTER REMOVAL.

#LEADS ARE INSULATED AND STORED.

TABLE B
109A LOUDSPEAKER SET

CONNECTIONS TO JACK A (IVORY)

FUNCTION OF LEAD IN COM KEY 416 CABLE	CONNECT (NOTE 1)		
	FROM	TO	
	JACK A (IVORY)	91A CONN. BLOCK (SEE NOTE 2 AND 4)	STD CUTDOWN ON 66-TYPE CONN. BLOCK (OPTIONAL)
+V	R	45	Y-S
COM	B	20	S-Y
DSS (SEE NOTE 3)	G	D1	BR-BK
		D2	BK-BR
		D3	O-Y
		D4	Y-O
		D5	BR-Y
		D6	Y-BR
		D7	BL-V
		D8	V-BL
		D9	O-V
		D10	V-O

NOTE 1 USE INSIDE WIRE TO MAKE CONNECTIONS.

NOTE 2 SHORT THE FOUR PHYSICALLY ADJACENT TERMINALS 20, M, R1, AND R2 AND SHORT THE FOUR PHYSICALLY ADJACENT TERMINALS T2, T1, M, AND 45.

NOTE 3 CONNECTION IS MADE TO ONE OF THE DSS ZONES D1 - D10 AS APPROPRIATE.

NOTE 4 IF CONNECTIONS ARE MADE TO THE 91A CONN. BLOCK SERVING EITHER PRIMARY SET; THE SHORTS OF NOTE 2 ARE NOT REQUIRED.

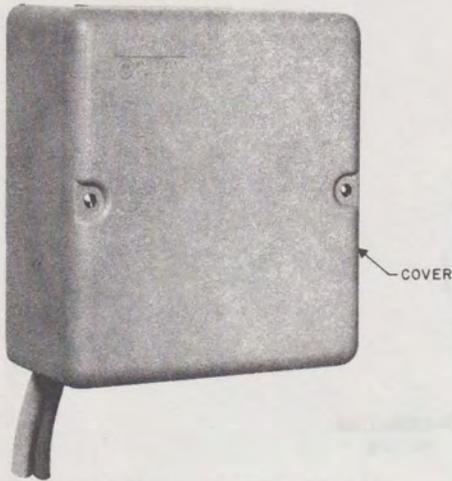


FIGURE 1. 24 A APPARATUS UNIT

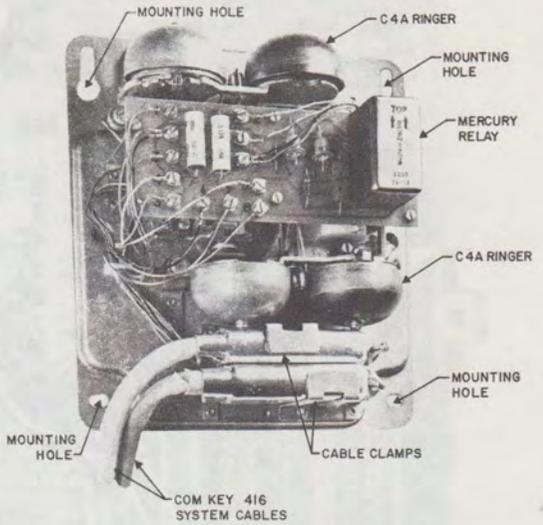


FIGURE 2. 24 A APPARATUS UNIT

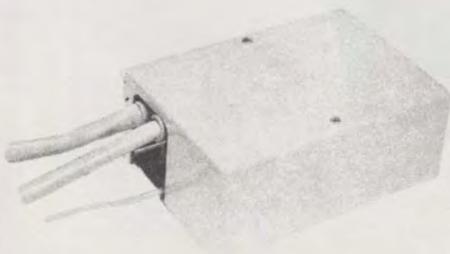


FIGURE 3. 25 A APPARATUS UNIT

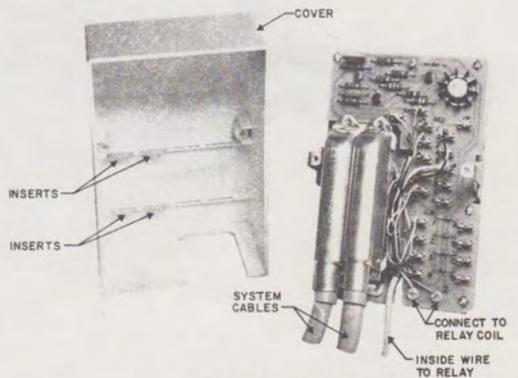


FIGURE 4. 25 A APPARATUS UNIT

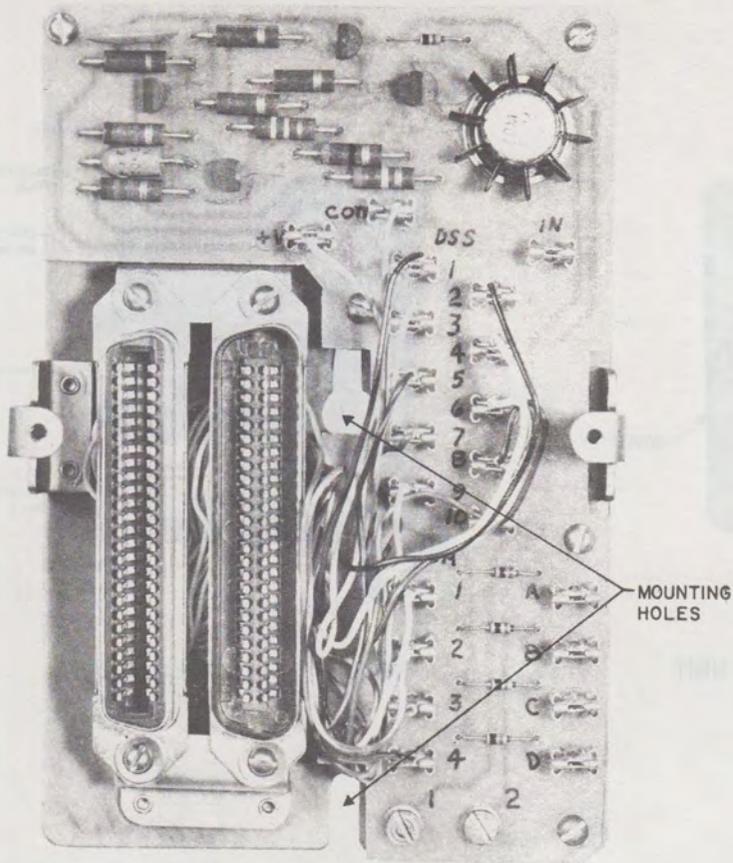


FIGURE 5. 25 A BASE PAN ASSEMBLY

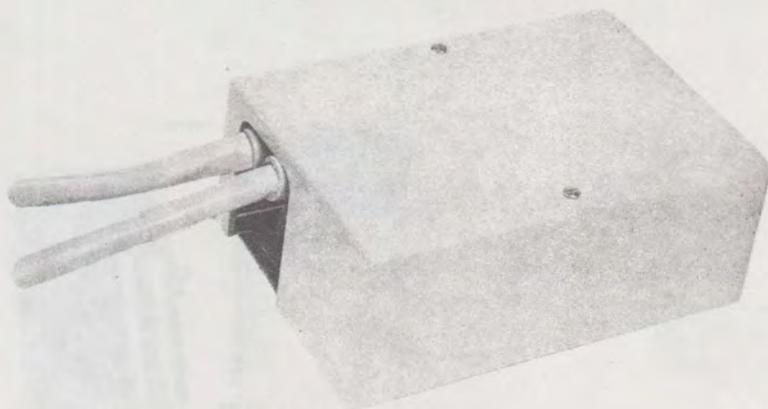


FIGURE 6. 26 A APPARATUS UNIT

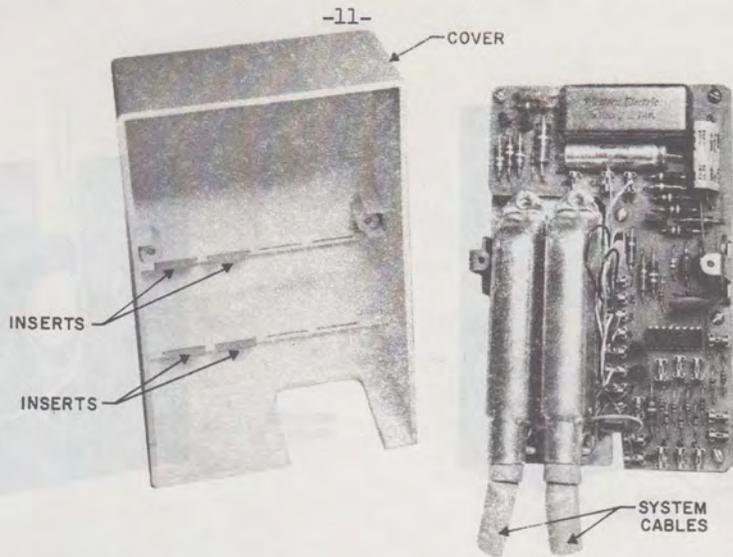


FIGURE 7. 26 A APPARATUS UNIT

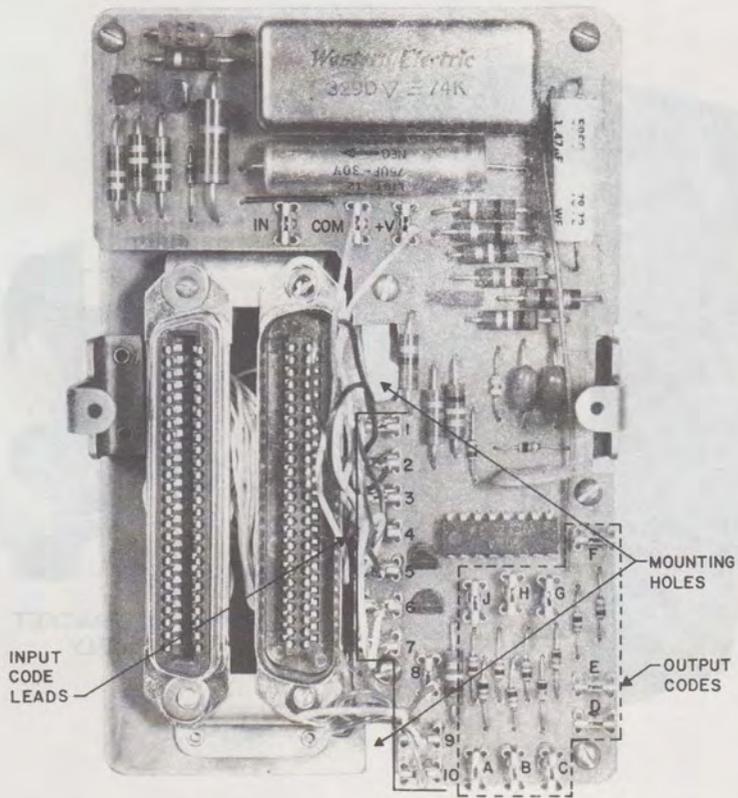


FIGURE 8. 26 A APPARATUS UNIT BASE

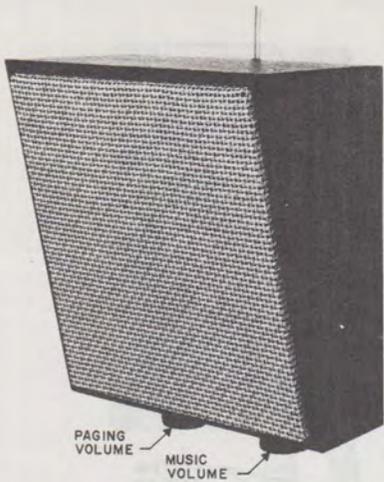


FIGURE 9. 109 A LOUDSPEAKER SET

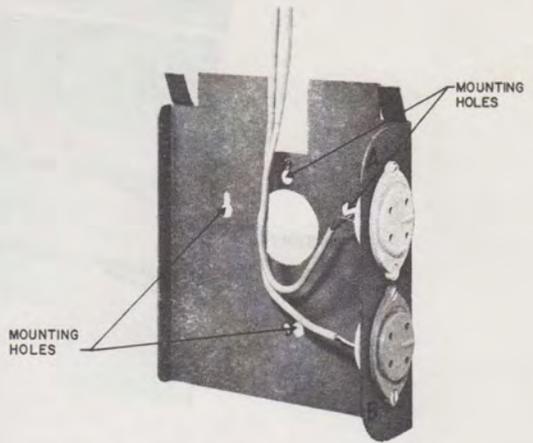


FIGURE 10. WALL BRACKET ASSEMBLY

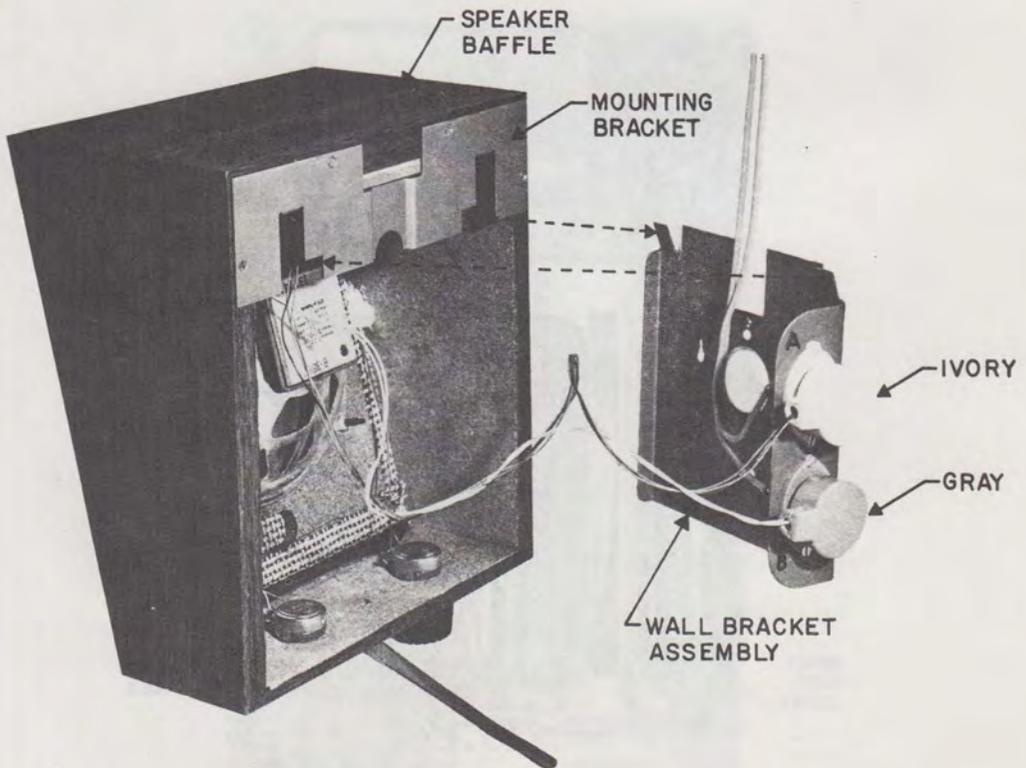


FIGURE 11. 109 A LOUDSPEAKER SET

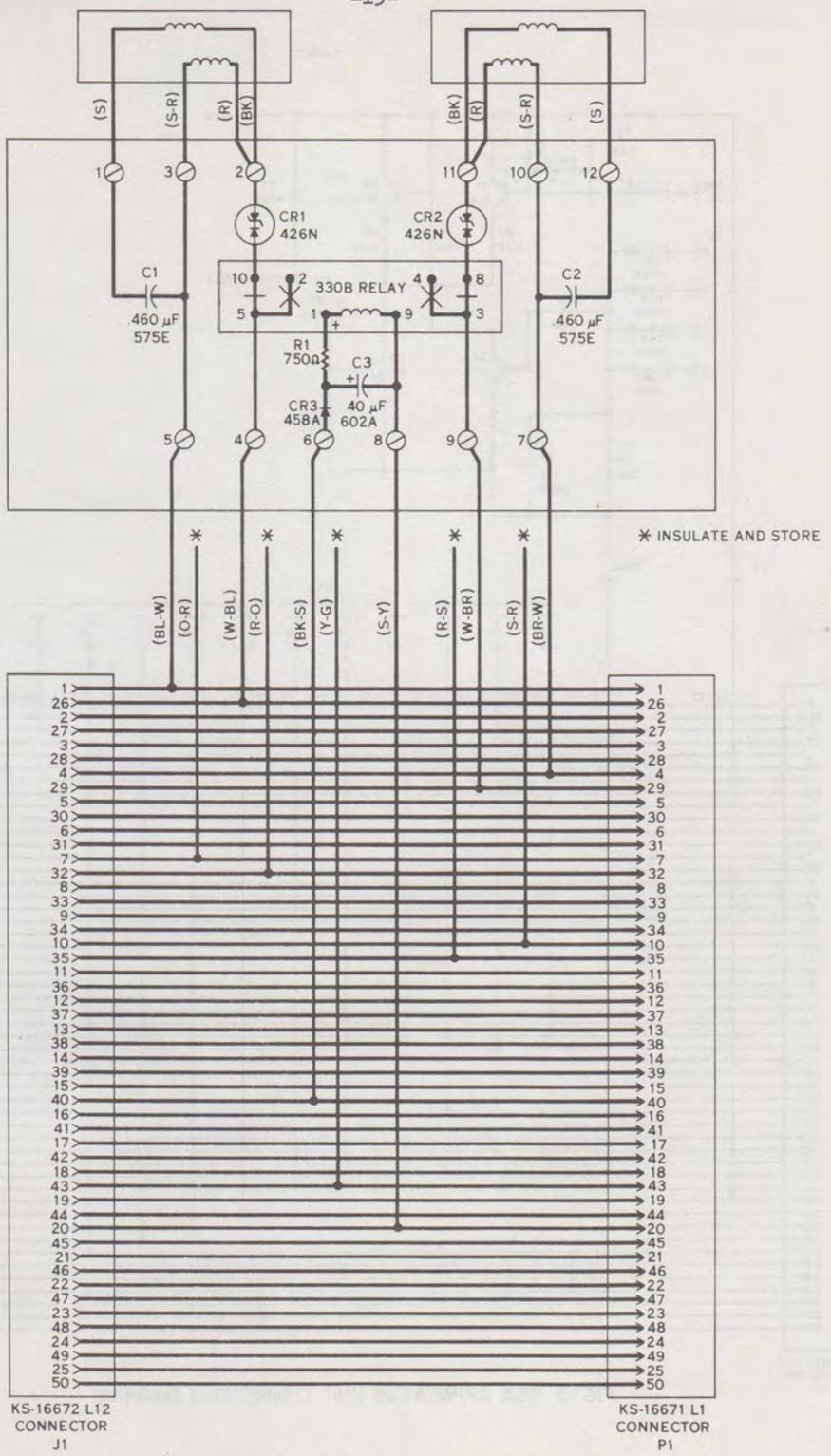


FIG. 12. 24A APPARATUS CONNECTING DIAGRAM

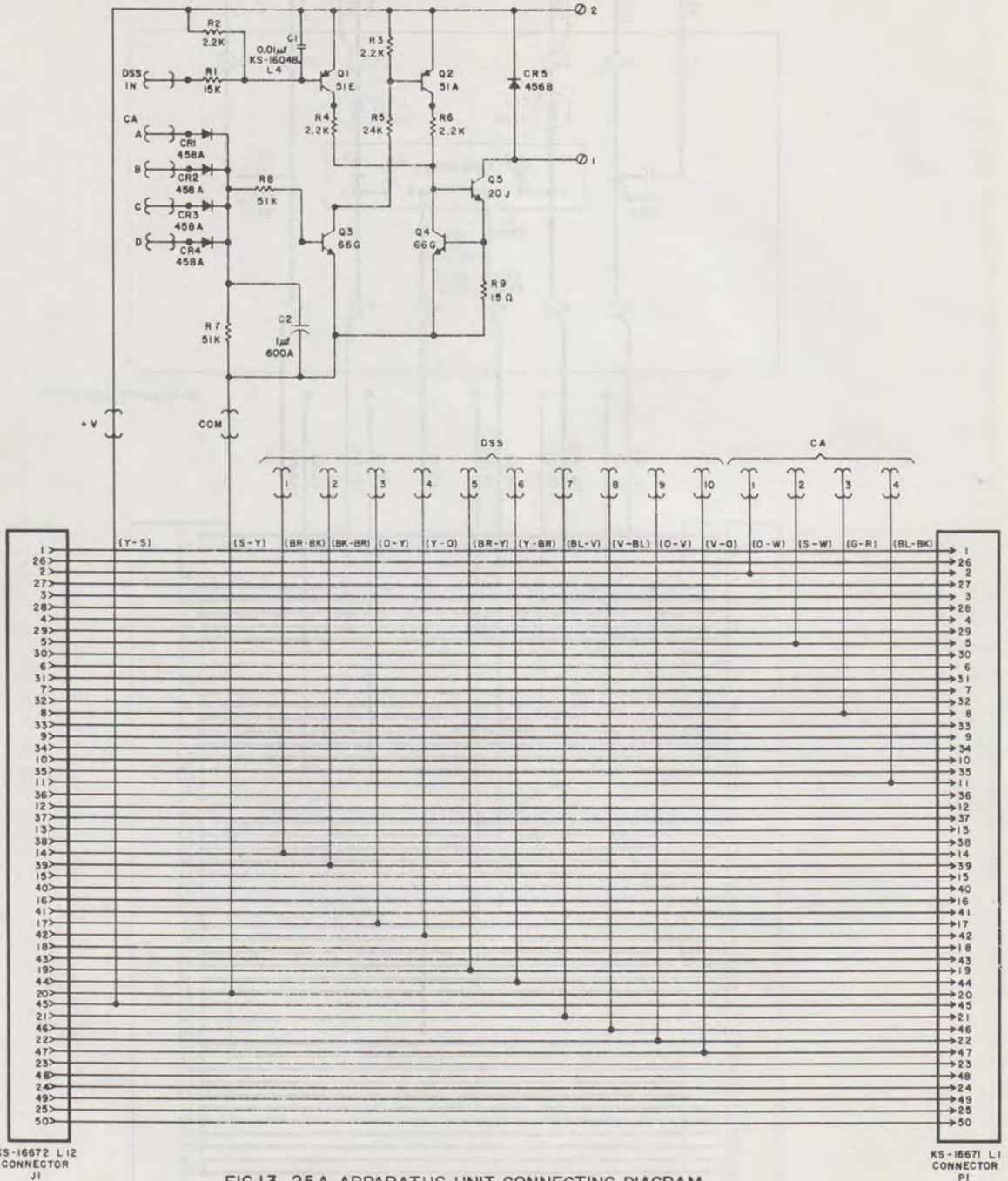
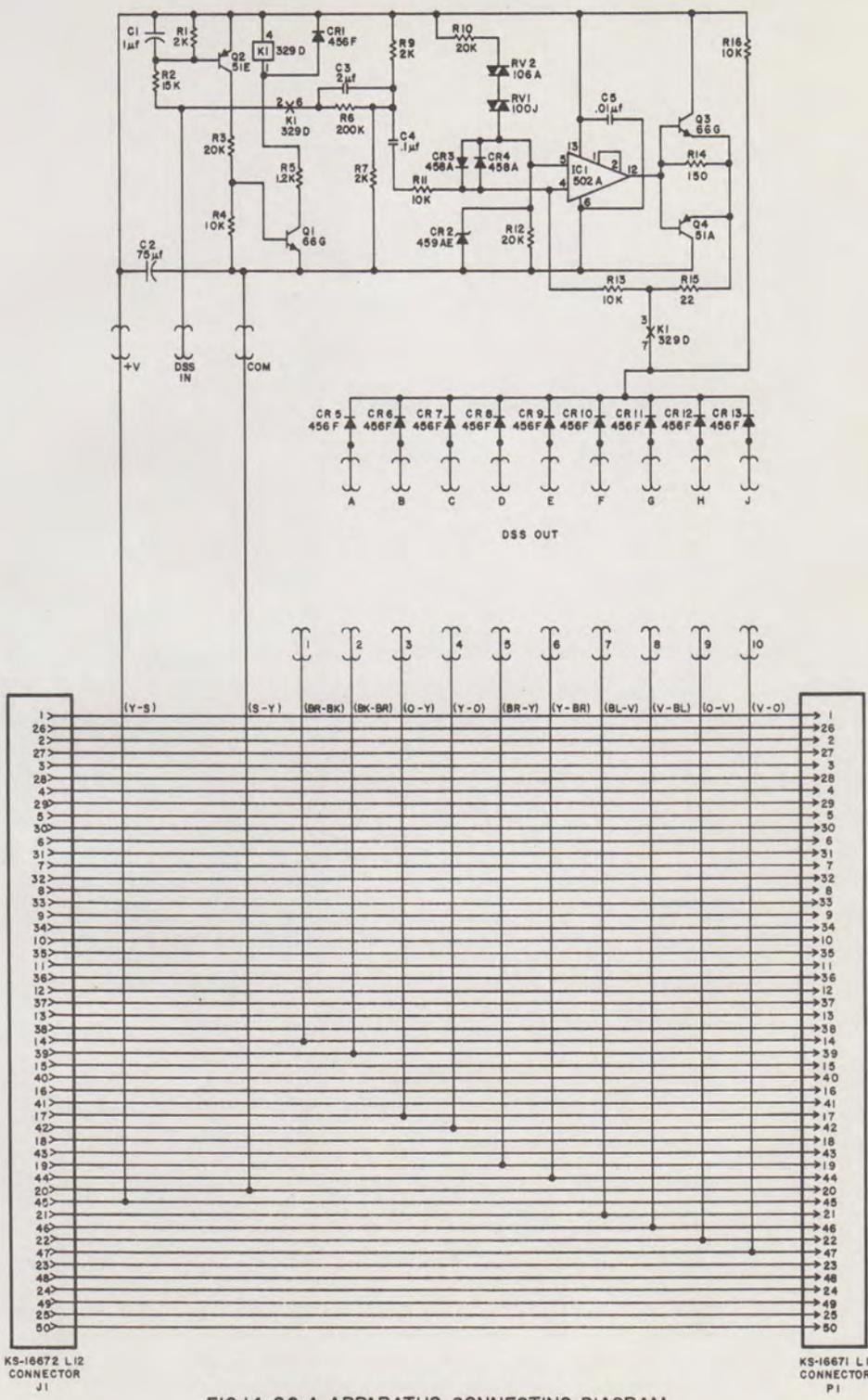


FIG.13. 25A APPARATUS UNIT CONNECTING DIAGRAM

KS-16672 L I2
CONNECTOR
J1

KS-16671 L I
CONNECTOR
P1



KS-16672 L12
CONNECTOR
J1

KS-16671 L1
CONNECTOR
P1

FIG.14. 26 A APPARATUS CONNECTING DIAGRAM

4A COMMUNICATION SYSTEM

COM KEY* 416

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behind a PBX). Available optional features are privacy, music-on-hold (utilizing customer-provided music source), supplementary external ringing, station restriction and TOUCH-TONE® dialing. TOUCH-TONE and rotary sets may be intermixed in the same system.

Note: Speakerphone capability is not provided.

1.04 The 4A System has a maximum capacity of 4 CO/PBX lines and 16 stations. Two basic types of telephone sets, called primary and satellite, are employed. Each primary station contains the logic circuitry, power supply and clock circuitry for two CO/PBX lines and one intercom path. For small systems, one primary set may be used to provide two CO/PBX lines, one intercom path, and up to seven satellite stations. The addition of the second primary station simply doubles the system capacity. Satellite station sets provide the same service as primary station sets except they do not contain any control circuits.

1.05 Every station can be programmed to ring on any combination of CO/PBX lines. All stations have access to all lines in the system; therefore, an attendant may or may not be used.

1.06 The system components are protected by a self-resetting thermal cut-off in the power supply of the primary stations, making separate fusing unnecessary.

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1. GENERAL

1.01 This section provides identification, installation, connection, and maintenance information for the 4A Communication System (COM KEY 416).

1.02 Whenever this section is reissued, the reason for reissue will be listed in this paragraph.

1.03 The system provides basic line services such as pickup, hold and illumination, one or two intercom paths, tone and voice signaling, multiline conferencing, built-in loudspeaker service, flexible tone ringing, automatic button restoration (ABR), outgoing service during power failure, privacy release, and recall (operator flash) when used

2. IDENTIFICATION

2.01 The 4A System provides up to 4 CO/PBX lines, up to 16 stations and 2 intercom paths. A brief description of system features is listed.

BASIC FEATURES

- (a) **Pickup, Hold, and Illumination**—Standard key system pickup, hold and line status lamps, including wink hold.

- (b) **Two-Path Intercom**—Each intercom path is associated with a separate button and lamp on each telephone set.
- (c) **Multiline Conferencing**—Two or more CO/PBX lines may be conferenced by *simultaneously* depressing the line buttons of the lines to be conferenced.

Note: Intercom and CO/PBX lines cannot be conferenced together.

- (d) **Tone and Voice Signaling**—CO/PBX line alerting signal is by tone source rather than conventional ringer. By lifting the handset, selecting an idle intercom path, and depressing a DSS button, the calling station may voice-signal the called party. Multiple stations may be signaled by depressing more than one DSS button at a time.
- (e) **Built-in Loudspeaker Service**—By depressing the button designated SPKR, the telephone set user can bridge the speaker in his set onto the receiver of his handset. This enables others in the room to hear both sides of a conversation. If so desired, this feature may be disabled by the installer.
- (f) **Automatic Button Restoration**—ABR returns depressed line or intercom buttons to the unoperated position when the handset is replaced on the set.
- (g) **RECALL**—Used to drop a line in order to receive a second dial tone without going back on-hook. When the telephone set is used behind a PBX, a momentary depression of the RECALL button will signal the attendant (similar to switchhook flash function).
- (h) **CO/PBX Ringing**—Each station can be arranged to ring on all lines, any combination of lines, or not at all. Ringing is programmed at each station set.
- (i) **Wall Mounting**—Provides necessary hardware (D-180658 kit of parts) to wall-mount a satellite set.

Note: Primary sets cannot be wall-mounted.

- (j) **Privacy Release**—Privacy Release allows a station to permit privacy-equipped stations that have been locked out of call to bridge into

the conversation. All 4A System telephone sets are factory-wired with Privacy Release which is activated when the optional privacy feature is installed.

OPTIONAL FEATURES



The following features should be implemented only when specifically covered in the service order.

- (k) **Privacy**—Privacy prevents a station from bridging into a CO/PBX call in progress.

Note: Intercom lines have no privacy.

- (l) **Music-on-Hold**—Provides music from customer-provided music source to calls placed on hold.
- (m) **External Ringing**—External ringing may be provided by connecting an external ringer across the CO/PBX tip and ring leads at the primary station.
- (n) **Station Restriction**—Provides for outgoing call restriction by changing dial connections in telephone set.
- (o) **TOUCH-TONE Set**—Provides TOUCH-TONE dialing. Rotary and TOUCH-TONE dial sets may be intermixed in the system without additional equipment.

TELEPHONE SETS

2.02 The 4A System uses telephone sets designed for this system (Fig. 1 and 2). They are not compatible with other systems.

2.03 Two types of telephone sets are used in the system. The satellite set contains speech circuitry, line pickup key, DSS key, and loudspeaker. The primary set is a slightly larger set which, in addition to the components of the satellite set, contains the logic circuit to provide hold and lamp control for two CO/PBX lines and lamp control for one intercom line. Solid state lamps are associated with each line pickup button to indicate ringing, hold, active, or idle status by standard flashing rates, steady lamps, or no lamps. Intercom status is also indicated by an ON or OFF lamp.



Fig. 1—2836AM-50 (Primary) Telephone Set

2.04 Each telephone set contains a 664A (DSS) key, a speaker and volume control, and a 647M6 (10 button) key. The DSS field is interconnected with the intercom buttons. After selecting one of the idle intercom paths, the user must depress the desired DSS button which connects his handset transmitter to the speaker in the telephone sets associated with that DSS button. The DSS button must be held depressed for the duration of the one-way voice transmission. Although the voice signaling path is unidirectional, the called station may establish a 2-way path by lifting his handset and depressing the intercom button on his set as instructed by the calling party. Calling party may then release DSS button. Multiple stations may be signaled by depressing more than one button at a time. The 664A key has a slide programming switch which connects that set speaker to the DSS number desired for that station. This key also has four vertical OFF-ON switches which control common

audible ringing at the station. The loudspeaker located under the telephone set handset receives both the tone and voice signaling. Loudness is controlled by the volume control. Button assignments of the 647M6 key are: HOLD, four CO/PBX lines, two intercom paths, privacy-release ((PRIV RLS), built-in loudspeaker service (SPKR), and RECALL. The SPKR button may be disabled by the installer if this feature is not required.

2.05 The 4A System will interface with all PBXs except that it cannot provide for ground-start operation of CO trunks which bypass the PBX in the event of PBX power failure. In all other respects, the system performs on PBX lines in the same manner as on CO lines. For PBX use, the only restriction on the number of telephone sets is that each 25-pair connector cable system can serve a maximum of 2 primary stations and



A. DESK CONFIGURATION



B. WALL CONFIGURATION

Fig. 2—837AM-50 (Satellite) Telephone Set

14 satellite stations. Although 4A System telephone sets in each system have full capabilities, they can contact telephone sets in other systems only via PBX lines. To signal the PBX operator, the recall button should be used.

ORDERING GUIDE

- Set, Telephone (order as required):

836AM-50 (rotary dial primary set)

837AM-50 (rotary dial satellite set)

2836AM-50 (TOUCH-TONE primary set)

2837AM-50 (TOUCH-TONE satellite set)

Note: Sets are supplied in ivory-50 only and are shipped with a disposable faceplate. Desired faceplate must be ordered separately.

- Plate, Face, 836A-* (for 836AM or 837AM)
- Plate, Face, 2836A-* (for 2836AM or 2837AM)

*Add color suffix as follows:

Avocado—100

Teak—108

Walnut—109

Gold—111

Orange—112

Brown—113

Red—114

Blue—115

Black—118

- Kit of Parts, D-180658 (one required for each 837- or 2837-type set to be wall-mounted)
- Block, Connecting, 91A (order one for each primary station).

Order as required the following depending on the job requirements. Refer to Fig. 3 and 4 for typical wiring arrangements.

- Adapter, Bridging, KS-19252 (order by list number as required) (Fig. 3)
- Cable, Connector, B25A (specify desired length) (Fig. 3)

- Block Connecting 66E3-25 (Fig. 3)
- Block, Connecting 66B4-25 (Fig. 4)
- Cable, Connector, A25B (specify desired length) (Fig. 4)
- Backboard, 184B1 (Fig. 4).

Optional Apparatus (Order as Required)

- Coupler, Voice, 33A (one required when music-on-hold is provided)
- Kit of Parts, D-180605 (one required for each primary station to be equipped for music-on-hold)
- Kit of Parts, D-180604 (privacy circuit, one required for each station to be locked out).

Replaceable Components

- Dial, 8DT-119 or 35AH3D
- Cover, 840994560 (DSS key)
- Handset, K1B-50 and Cord H4DU-50
- Key, 647M6 (line)
- Assembly, Potentiometer, 840694350
- Assembly, Button, Lamp, 840362263
- Transformer, KS-21361, L1 (includes 6-foot power cord and heat sink).

3. INSTALLATION

PLANNING

3.01 The primary stations should be located within power cord length (6 feet) of a grounded ac receptacle. The ac receptacle should be separately fused and not under control of a switch.

Caution: *Except for the 110V power cord, no connection shall be made between any point in this system and building ground.*

3.02 Normally, a 4A System installation will consist of a maximum of ten stations

(primary stations included). The following cable restrictions apply to any installation:

- There should be no more than 1000 running feet of cable between any satellite station and both primary stations.
- No more than 2000 running feet (total) of cable should be used in any installation.

The 4A System can be expanded to a maximum of 16 stations (including primary stations) provided the cable restrictions in Table A are followed. There are only ten DSS buttons so DSS lines must be shared, as required, when the system exceeds ten stations. In a system where only one primary station is required, the total number of satellite sets shall not exceed seven stations with no station more than 1000 feet from the primary station and no more than 2000 running feet (total) of cable in the system. See Fig. 3 and 4 for typical arrangements.

3.03 Select appropriate apparatus according to job requirements (see ORDERING GUIDE).

INSTALLING

3.04 Install 91A connecting blocks, KS-19252, L1 bridging adapters or 66E3-25 connecting blocks, at desired locations using shortest length of connector cables. Also install wall brackets from D-180658 kit of parts where wall sets are to be installed. Use proper mounting hardware depending on wall surface.

3.05 Use care when unpacking telephone sets to avoid damage. Install sets in desired locations.

3.06 Primary sets are factory-wired so that the CO/PBX lines appear on lines 1 and 2 and the intercom on IC1. If the system uses two primary sets, one must be modified to move the line appearances to 3 and 4 and IC2 as follows:

- (1) Unplug 110V power cord from power receptacle if connected. Remove the power transformer assembly by pulling out on the bottom of the heat sink. If desired, a screwdriver may be used to carefully pry the transformer loose (Fig. 5). **Do not pull on transformer cord.**

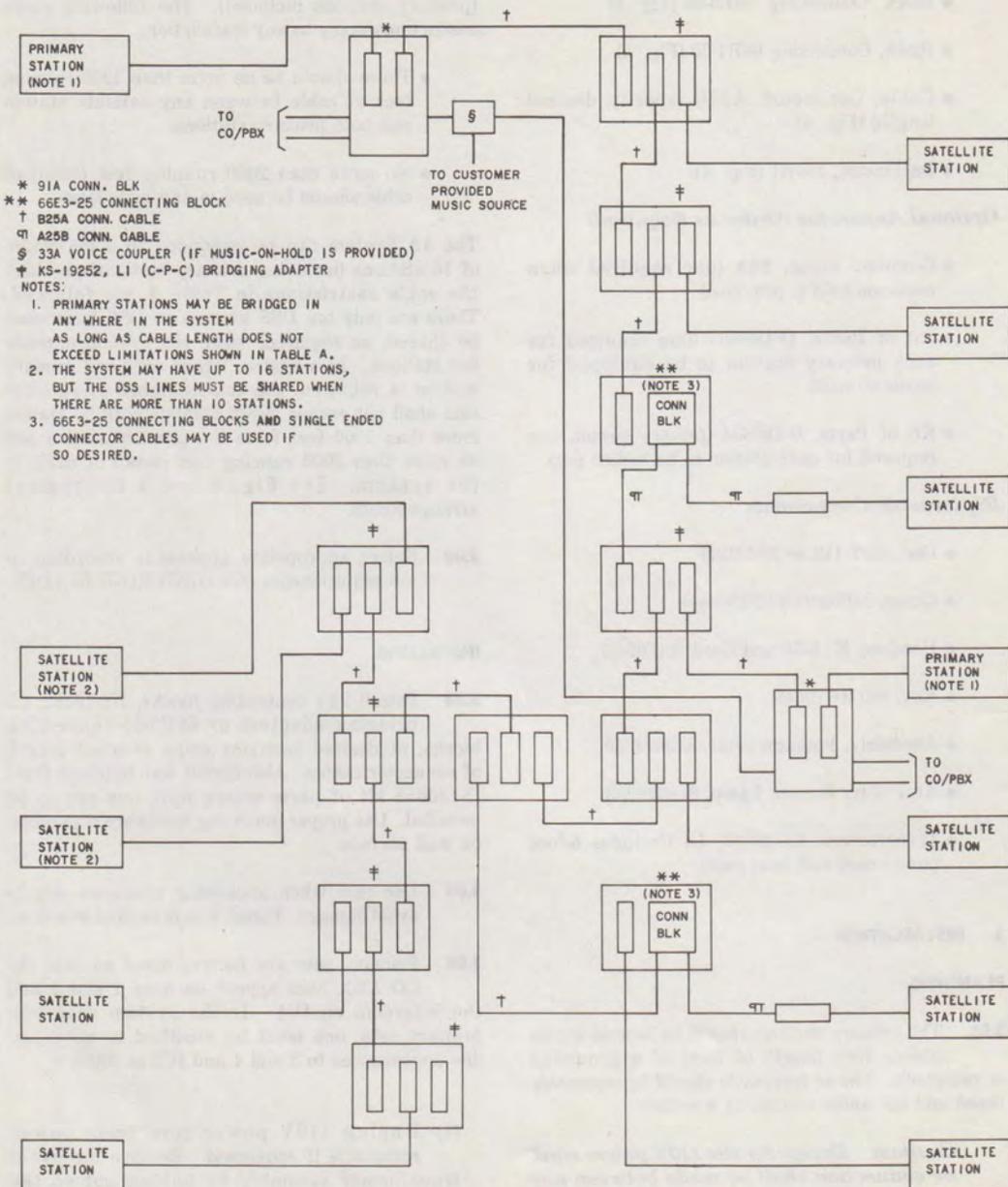
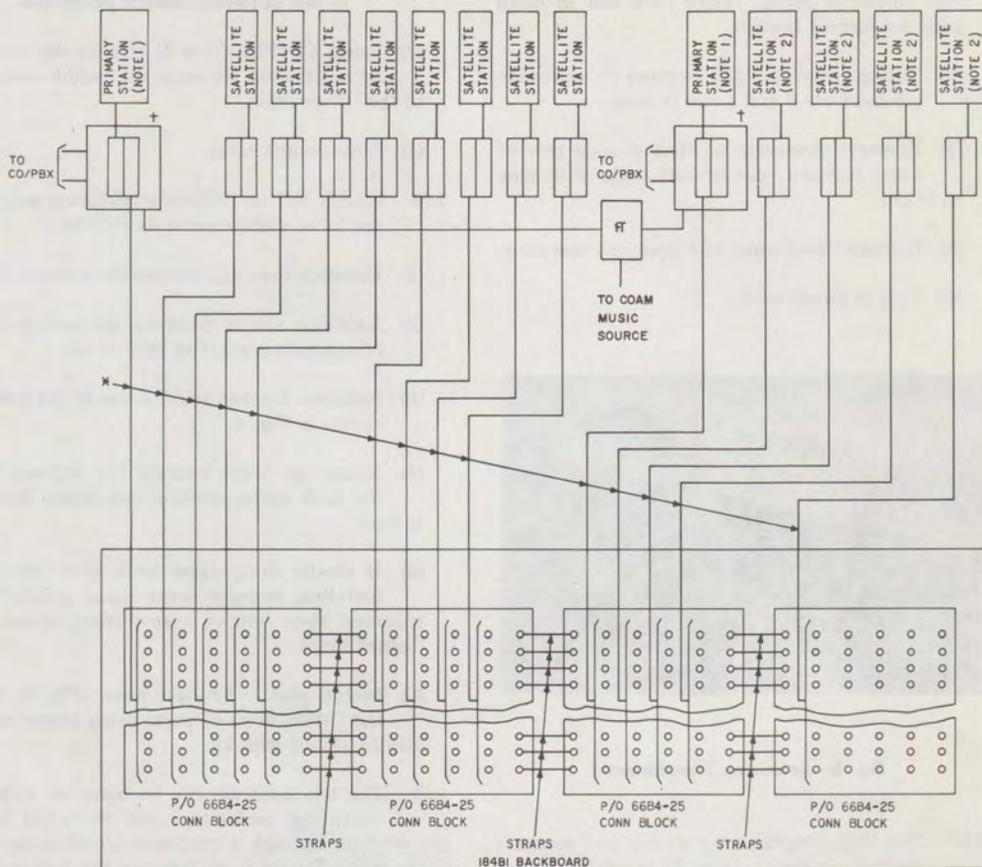


Fig. 3—Typical Installation, Using Bridging Adapters and Connecting Blocks



NOTES:

1. CONTROL STATIONS MAY BE BRIDGED IN ANYWHERE IN THE SYSTEM AS LONG AS CABLE LENGTH DOES NOT EXCEED LIMITATIONS SHOWN IN TABLE A.
 2. THE SYSTEM MAY HAVE UP TO 16 STATIONS BUT WITH ONLY 10 DSS LINES AVAILABLE. THE DSS LINES MUST BE SHARED WHEN THERE ARE MORE THAN 10 STATIONS.
- * A25B CONN. CABLES (SINGLE-ENDED)
 + 91A CONNECTING BLOCK
 FT 33A VOICE COUPLER (IF MUSIC ON HOLD IS PROVIDED)

Fig. 4—Typical Installation, Using Home Run Method

- (2) Remove line assignment connector (Fig. 6) by pulling straight up until connector clears pins on circuit board. **Take care not to bend pins on circuit board.**
- (3) Rotate connector 180 degrees so that side labeled lines 3 and 4 can be seen.
- (4) Reinsert connector so that outside row of holes (toward rear of set) mate with pins on board.
- (5) Replace transformer and heat sink assembly.
- (6) Plug in power cord.



Fig. 5—Removing Transformer

3.07 The DSS programming switch and common audible switches (Fig. 7) must be set as required at each station as follows:

- (1) Raise cover either by pressing on the extreme left end to tilt the cover or pry up the right end of the cover using a fingernail.
- (2) Determine the DSS code for that station and slide the program switch to that number. For example, Fig. 7 shows the station designated as DSS code 7.



More than one station set may be programmed for the same DSS code. Also, a set may be programmed so that it does not have a DSS code by moving the switch to the OFF (extreme

left) position. When positioning the program switch, take care the switch is not between detent positions.

- (3) Select CO/PBX lines to ring at the stations by positioning the common audible switches to the ON position.
- (4) Close switch cover.

3.08 Modify 837- or 2837-type telephone sets that are to be wall-mounted as follows:

- (1) Loosen screws and remove the lower housing.
- (2) Remove screw holding mounting cord attachment bracket at rear of set.
- (3) Refasten bracket using screw in the position shown in Fig. 8.
- (4) Rotate the lower housing 180 degrees from the desk model position and fasten housing to base.
- (5) If plastic designation card cover has been installed, remove cover using a KS-16750 releaser, then remove screw from recess and discard screw.
- (6) Install plastic handset hook (Fig. 9) from the D-180658 kit of parts using longer screw also furnished with kit.

3.09 The telephone set can be mounted with the mounting cord either run vertically down the wall or through a customer-provided opening in the wall. The set is mounted on the wall bracket supplied with the kit of parts by positioning the set, so that the four tabs on the bracket engage the openings in the lower housing, and sliding the set downward until the snap-lock engages. Check to make sure that all tabs are engaged and the set locked on the bracket. To remove the set, press the tab on the wall bracket, which extends below the set, toward the wall while pushing the set upward.

OPTIONS

3.10 External Ringer—Connect leads from E1C ringer to screw terminals on 91A connecting block associated with primary telephone sets as shown in Table B. If an external ringer is desired

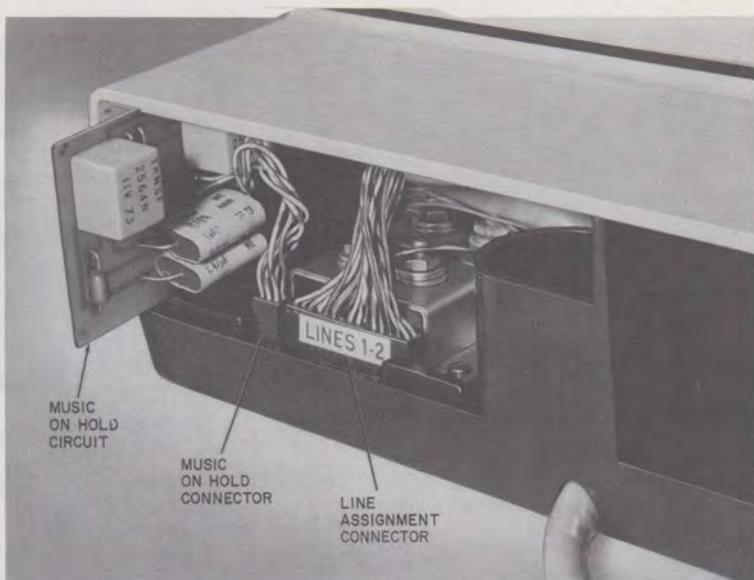


Fig. 6—Line Assignment Connector and Music-on-Hold Board

at a satellite station, install the ringer at that location using D inside wire to connect it to the proper R () and T () terminals of the primary set 91A connecting block. **Do not attempt to wire ringer to any other pair in the system. Do not connect more than three E1C ringers to any CO/PBX line.**

3.11 Dial Restriction—Restrict stations as follows:

- (1) Remove faceplate by inserting a KS-16750 tool in the notch near the center of the faceplate and raising upward to bow faceplate (Fig. 10).
- (2) Loosen two captive screws holding DSS key and move key to side.
- (3) On a TOUCH-TONE set, move the O-BK lead from terminal 36 to 31; on rotary sets, move the BL-R lead from terminal 28 to 39.
- (4) Replace DSS key.

- (5) Install faceplate by inserting in slots at bottom of set and bowing it until it will slide in slots at top of set (Fig. 11).

3.12 Music-On-Hold—This option requires the installation of a D-180605 kit of parts at each primary telephone set and one 33A voice coupler per system. Install kit of parts in the primary set(s) as follows:

- (1) Remove transformer as covered in 3.06 (1).
- (2) Insert music-on-hold circuit board vertically in slots provided in upper and lower housings (Fig. 6).
- (3) Plug in connector from circuit board to the pins provided as shown in Fig. 6. The connector may be plugged in either way.
- (4) Replace transformer and heat sink assembly.
- (5) Plug in power cord.

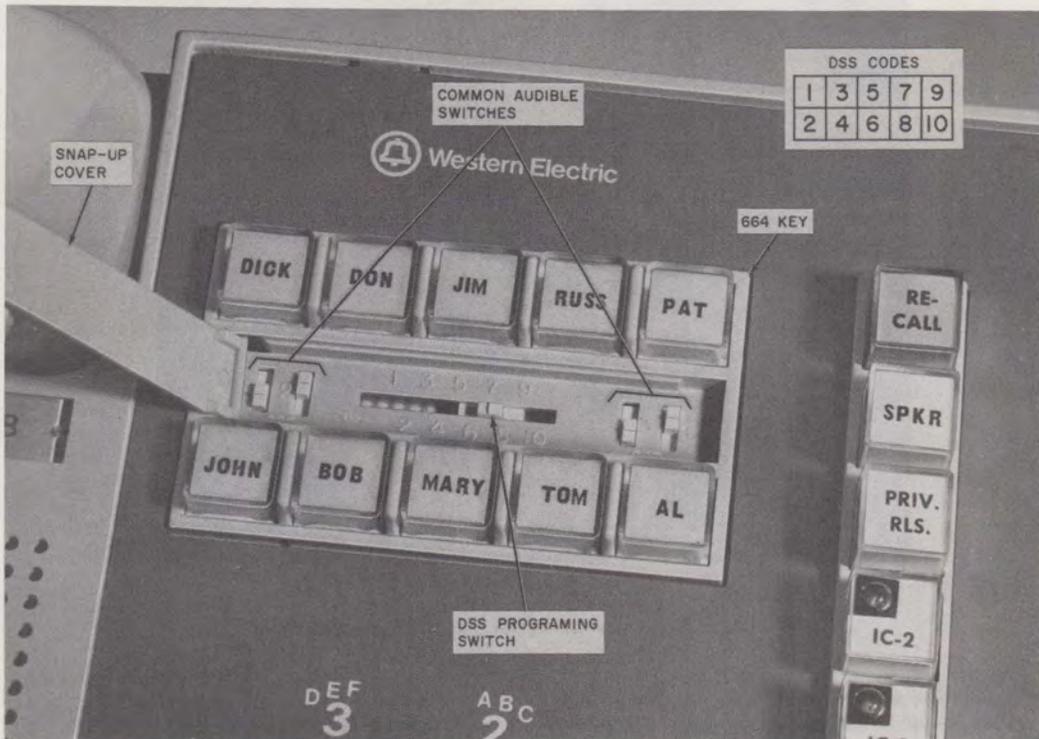


Fig. 7—DSS Key

3.13 Install the 33A voice coupler as follows:

- (1) Remove cover from coupler.
- (2) Mount coupler at location which permits customer to make connections and also allows connection to system.

Caution: Ensure that 35P fuses are installed with the spring at the bottom (Fig. 12) and set the volume control at approximately mid-range.

- (3) Connect primary station(s) to the voice coupler per Table C.
- (4) Replace cover.

- (5) Have customer connect his music source as shown in Table C.



The customer-provided music source must be capable of providing one watt of undistorted RMS power into a four-ohm load. In addition, the output of the music source must be ac coupled. Do not connect a source that has a dc voltage on the output.

3.14 Adjust volume level for music-on-hold as follows:

- Place a call to a station in the system.
- Answer call and place it on hold.

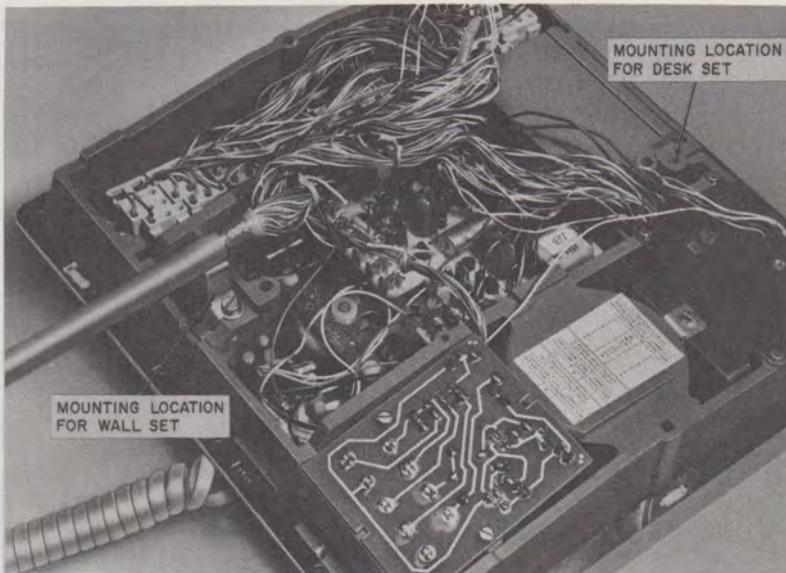


Fig. 8—Set Modification for Wall Mounting



Fig. 9—Handset Hook Attachment for Wall Set

- Have customer adjust his music source for a comfortable listening level at the held station.

3.15 The 33A voice coupler will accept input from any customer-provided apparatus that does not blow a fuse in the voice coupler. If the customer wants a copy of the technical reference covering the 33A voice coupler, contact the Telephone Company Business Office or the Marketing Representative. If service call is caused by customer-provided equipment, billing should be made in accordance with BSP 660-101-312.

3.16 Privacy—This option requires the installation of a D-180604 kit of parts at each station to be locked out. Install as follows:

- (1) Remove telephone set lower housing to obtain access to the amplifier printed wiring board.
- (2) Transfer leads from push-on terminals on amplifier board to those on privacy circuit board (Fig. 13). See Table D or wiring label on loudspeaker housing in set.



Fig. 11—Replacing Faceplate

3.18 Test privacy release as follows:

- (1) At station to be tested, go off-hook on an idle CO/PBX line to lock it out.
- (2) At another station equipped with a privacy circuit, go off-hook on the same line. No sidetone should be heard in this handset.
- (3) At the set under test, depress the PRIV RLS button momentarily. This should permit the privacy-equipped set to bridge onto the line.

3.19 To disable SPKR:

- (1) Remove faceplate by inserting a KS-16750 tool in the notch near the center of the faceplate and raising upward. See Fig. 10.
- (2) Remove DSS key.
- (3) Remove W-BR lead from telephone set terminal 9 and W-G from terminal 38. Insulate and store leads.
- (4) Replace DSS key.
- (5) Replace faceplate (see Fig. 11).

3.20 Install connector cables as required.



Fig. 12—33A Voice Coupler

4. CONNECTIONS

- 4.01 Terminate the incoming CO/PBX lines on the 91A connecting block(s) associated with the primary station(s). See Table E.
- 4.02 Connect primary station line cords to customer-provided ac power.

5. METHOD OF OPERATION

ANSWERING CALLS

Incoming Call on CO/PBX Line

- 5.01 When audible tone signal sounds and lamp associated with CO/PBX button flashes, answer call as follows:
 - (1) Lift handset (line buttons will not lock down unless handset is off-hook).

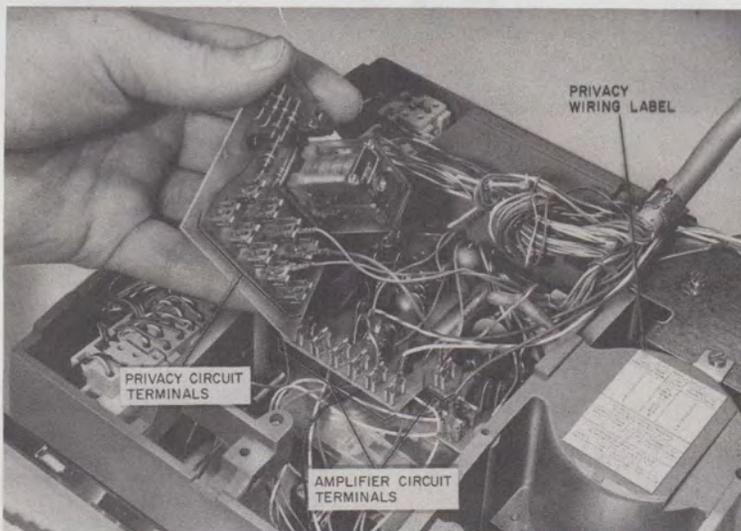


Fig. 13—Privacy Circuit Connections

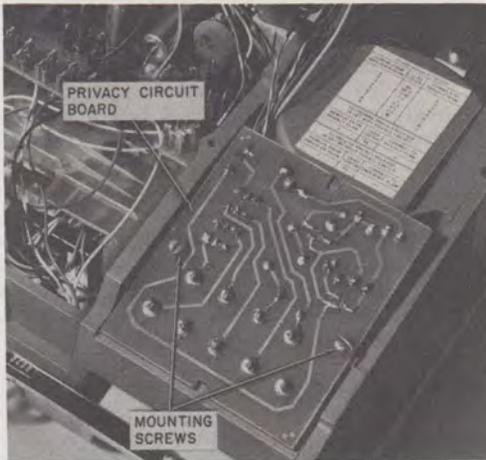


Fig. 14—Mounting Privacy Circuit

- (2) Depress CO/PBX button associated with flashing lamp—audible signal is silenced and lamp under CO/PBX button goes steady.
- (3) Answer call.

Note: The level of incoming voice signaling or tone ringing will be slightly reduced while off-hook.

Intercom Call

5.02 When voice signal is heard:

- (1) Calling party will tell you what action to take (if any).
- (2) If necessary, lift handset and depress intercom button as per instructions to converse with calling party.

PLACING CALLS

Outgoing Call (Any Station)

5.03 To make an outgoing call:

- (1) Lift handset.

- (2) Depress CO/PBX button associated with an idle line.
- (3) Dial number when dial tone is received.

Intercom Call (Any Station)

5.04 To make an intercom call:

- (1) Lift handset.
- (2) Select idle intercom path and depress button. No dial tone is provided on intercom.
- (3) Depress and hold button on DSS key corresponding to desired station that is to receive voice message. Multiple stations may be signaled by depressing more than one DSS button at a time. Give message to called party. ***DSS button must be held depressed during entire one-way conversation.***
- (4) Release button when one-way message is completed.
- (5) To carry on a 2-way conversation, the called party must pick up handset and depress the intercom button on his set that is seized by the calling party.

Multiple CO/PBX Conferencing

5.05 To conference CO/PBX lines:

- (1) Make outgoing call (5.03) to desired party.
- (2) Depress HOLD button; line button will restore and go on hold.
- (3) Make outgoing call on another idle CO/PBX line.
- (4) While holding the second CO/PBX line button down, depress the first held line button.
- (5) Additional parties may be added by repeating the above procedure.

Note: Since no amplification is provided, this type of conferencing is limited. When the number of conferenced parties exceeds three, satisfactory results are not to be expected. The distant parties may not be able to hear each other.

5.06 All lines that are conferenced together may be put on hold simultaneously by depressing the HOLD button.

5.07 To make a call during a conference:

- (1) Depress HOLD button—all buttons restore and lines go on hold.
- (2) Select an idle line.
- (3) Dial call.
- (4) To reenter conference again after call is completed, simultaneously depress conferenced buttons again.
- (5) If it is desired to add this call to the conference, hold this CO/PBX line button down and depress the conferenced CO/PBX line buttons.

5.08 If it is desired to add another call to the conference, hold the conferenced CO/PBX line buttons down and depress button of CO/PBX line to be added.

5.09 To prevent dropping one of the participants when setting up a conference, ensure that the conferenced CO/PBX line buttons are held down when adding another station.



Intercom and CO/PBX lines cannot be conferenced together.

Privacy, Privacy Release

5.10 To bring a locked-out station into a conversation, depress the PRIV RLS button. The line will go on hold with the lamp winking. The button must be held depressed until the locked-out party bridges onto the line at which time the lamp goes steady. The button should then be released.

5.11 To add a station equipped with privacy to a bridged conference, all of the sets already connected must depress their PRIV RLS button to allow the station to bridge onto the conference.

Built-in Loudspeaker Service

5.12 To use, depress button on line key designated SPKR. When conversation is finished, depress button to release SPKR before replacing handset. Otherwise, a slight feedback "squeal" may be heard as the handset is brought near the speaker.



Incoming voice and tone signaling will not be attenuated in the off-hook condition if the SPKR button is locked down. This button is not linked to the ABR mechanism.

6. MAINTENANCE

6.01 Maintenance of the 4A System is limited to making wiring checks, replacement of telephone sets, or those set components covered in this section. Do not attempt to modify or repair sets in a manner other than covered.

6.02 When trouble is encountered, **first make a thorough check of all connections**, then make the following checks before repair or replacement of telephone sets is considered.

- Primary station power cord is connected to a working ac receptacle.
- Primary station transformer(s) are securely in place.
- Sets are securely connected to adapters.
- Volume control is not turned all the way down.
- Lamps are not burned out.
- Incoming CO/PBX pairs are securely terminated on 91A connecting blocks associated with primary stations.
- Plugs are secure on line key.

6.03 If more than one set has the same trouble, the trouble is usually in a primary station set. In multiple primary set installations (three and four CO/PBX lines), the trouble can be further isolated by unplugging one primary set and observing operation of the remaining primary set. If service provided by the disabled primary set does not

restore to normal when the power cord is reconnected, that primary set is defective.

6.04 If normal service is provided on at least one set but not on any other set, the problem is probably in the cabling. If all sets beyond a point on the cable bus, relative to a primary set, exhibit the same trouble, the cable fault is an open conductor path. If all sets exhibit the same trouble and service can be restored to sets near a primary set by disconnecting the cable bus beyond that point, the fault is a conductor short.

6.05 Diagnostic Table F contains information to assist in trouble-shooting the system.

Dial Replacement

6.06 Replace rotary or TOUCH-TONE dial as follows:

- (1) Remove faceplate (see 3.11).
- (2) Remove DSS key (do not disconnect leads).
- (3) Remove and retain two screws holding dial in set.
- (4) Disconnect dial leads.
- (5) Transfer dial mounting brackets to new dial.
- (6) Connect dial leads and replace dial in set using screws removed in (2).
- (7) Replace DSS key.
- (8) Replace faceplate.
- (9) Test dial.

Handset and Cord

6.07 The handset cord is equipped with standard modular set plugs. To remove cord from the set or handset, release catch by depressing with finger or KS-16750 tool. When reinserting plugs, make sure cord is locked in place.

DSS Key Cover Replacement

6.08 Replace cover as follows:

- (1) Raise cover perpendicular to key.
- (2) Move the No. 1 common audible switch to OFF.
- (3) Twist the cover clockwise and snap out.
- (4) Install new cover twisting in the reverse direction.
- (5) Reset No. 1 switch to proper position and close cover.

Replacement of Line (647M6) key

6.09 To replace the ten-button line key:

- (1) Remove faceplate and key collar.
- (2) Loosen key mounting screws at both ends of key and carefully lift key out of set.
- (3) Unplug all 508-type plugs from defective key.
- (4) Connect plugs to replacement key in the following order starting with the HOLD key: pink, blue, orange, green, brown, slate, white, red, black, yellow, and beige.

Note: Check that each plug is held in place by the matching locking tabs on the key body.

- (5) Replace key in its mounting **making sure that the key latch bar hook properly engages the telephone set ABR pivot bar.**
- (6) Check that the wiring will not interfere with contact or button operation and tighten the key mounting screws.

6.10 Any time the line key has been removed or replaced, the following functional tests and necessary adjustments should be made:

- (1) With the set plugged in, check the ABR in each CO/PBX line by going off-hook, depressing and locking the line button and gently replacing handset. The associated lamp should

light while off-hook and the button restore when handset is replaced.

(2) Go off-hook, simultaneously lock down all four line buttons, and gently restore the handset. All buttons should release. Repeat for intercom buttons.

(3) Depress and lock one of the working CO/PBX line buttons and note lamp is steady. Very slowly depress any of the other line buttons until the first button is released. If the first line goes on hold as indicated by the steady lamp changing to wink, the key is defective and should be replaced. Make this test for each working line.

(4) With handset on-hook, completely depress each line and intercom button one at a time. The associated lamp should not light. If any of the lamps light, adjust the ABR by loosening the screw on the ABR bracket in the upper left-hand corner of the faceplate opening. Move the bracket slightly toward the front of the telephone set. Tighten the screw and repeat above test.

6.11 After all tests and adjustments have been made, replace key collar and install faceplate (Fig. 11).

Lamp Assembly Replacement

6.12 If the lamp is defective, the button assembly must be replaced as follows:

- (1) Remove faceplate and key collar.

- (2) Pinch the button assembly between the thumb and forefinger at the second joint.

- (3) Firmly but gently tilt the button to one side with the thumb until it snaps free from the plunger. Still holding the button slightly tilted, withdraw it from the lamp socket.

- (4) Orient new button assembly so that lamp is in upper left corner of the button when viewed from front of set. Place button over lamp socket, gently slide it into the opening, and push on top until it snaps into place.

Volume Control

6.13 Replace potentiometer assembly as follows:

- (1) Remove faceplate.
- (2) Remove DSS key. Do not disconnect leads.
- (3) Remove one screw holding assembly to base and disconnect leads from terminal field.
- (4) Install assembly in reverse order.

Transformer

6.14 The transformer is removed as covered in 3.06 (1). When installing transformer, make sure plug is properly engaged.

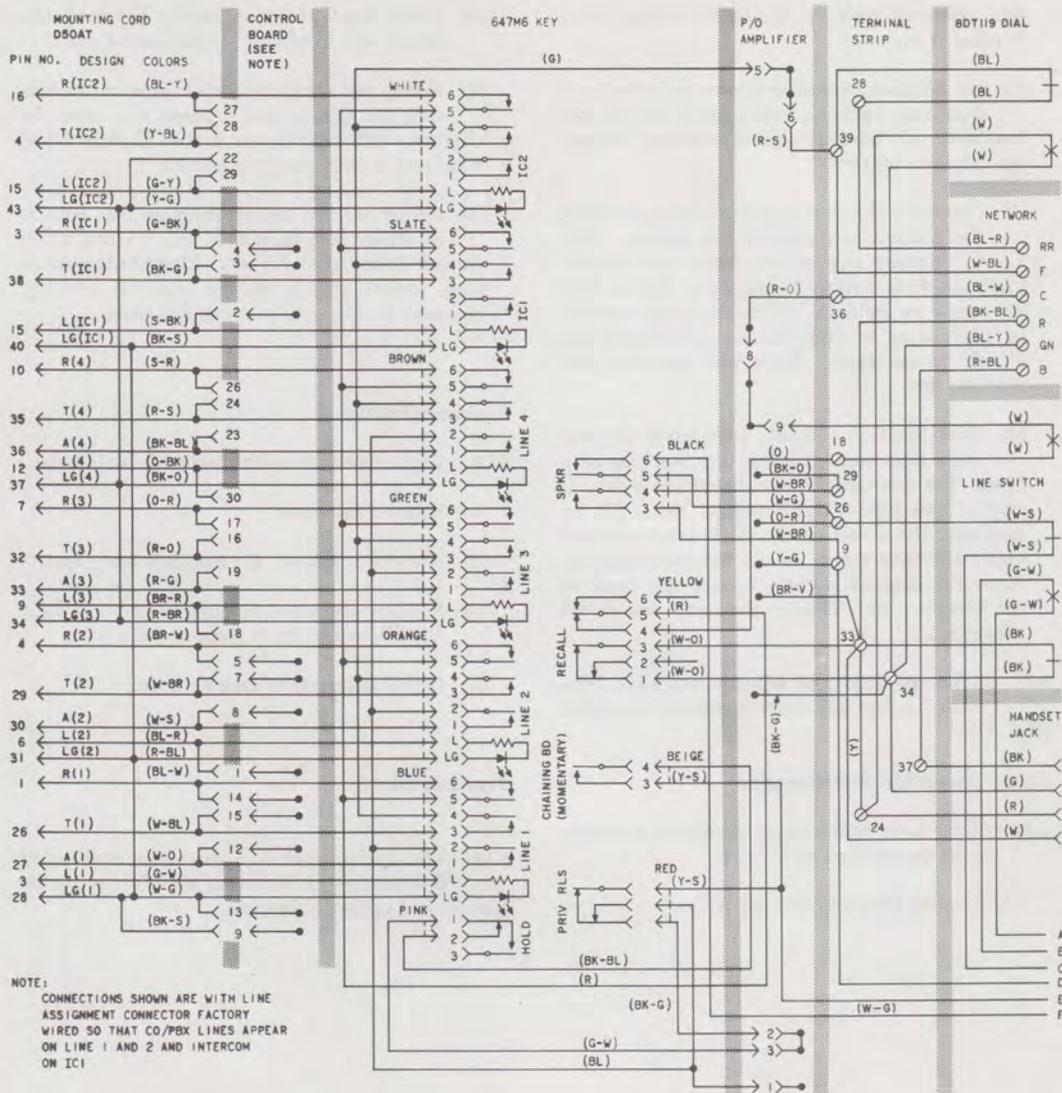


Fig. 15—Schematic, 836AM Telephone Set (Rotary Primary Station) (Sheet 1 of 2)

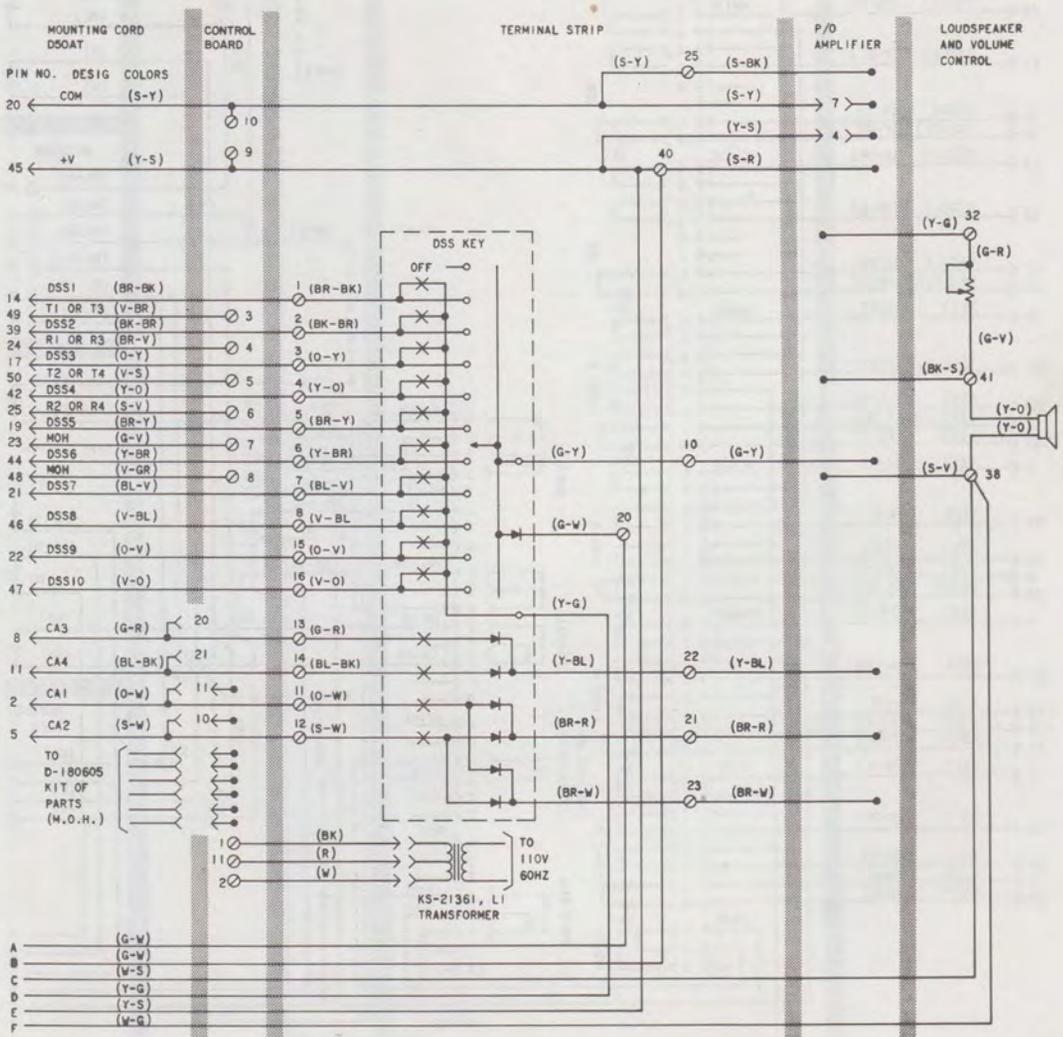


Fig. 15—Schematic, 836AM Telephone Set (Rotary Primary Station) (Sheet 2 of 2)

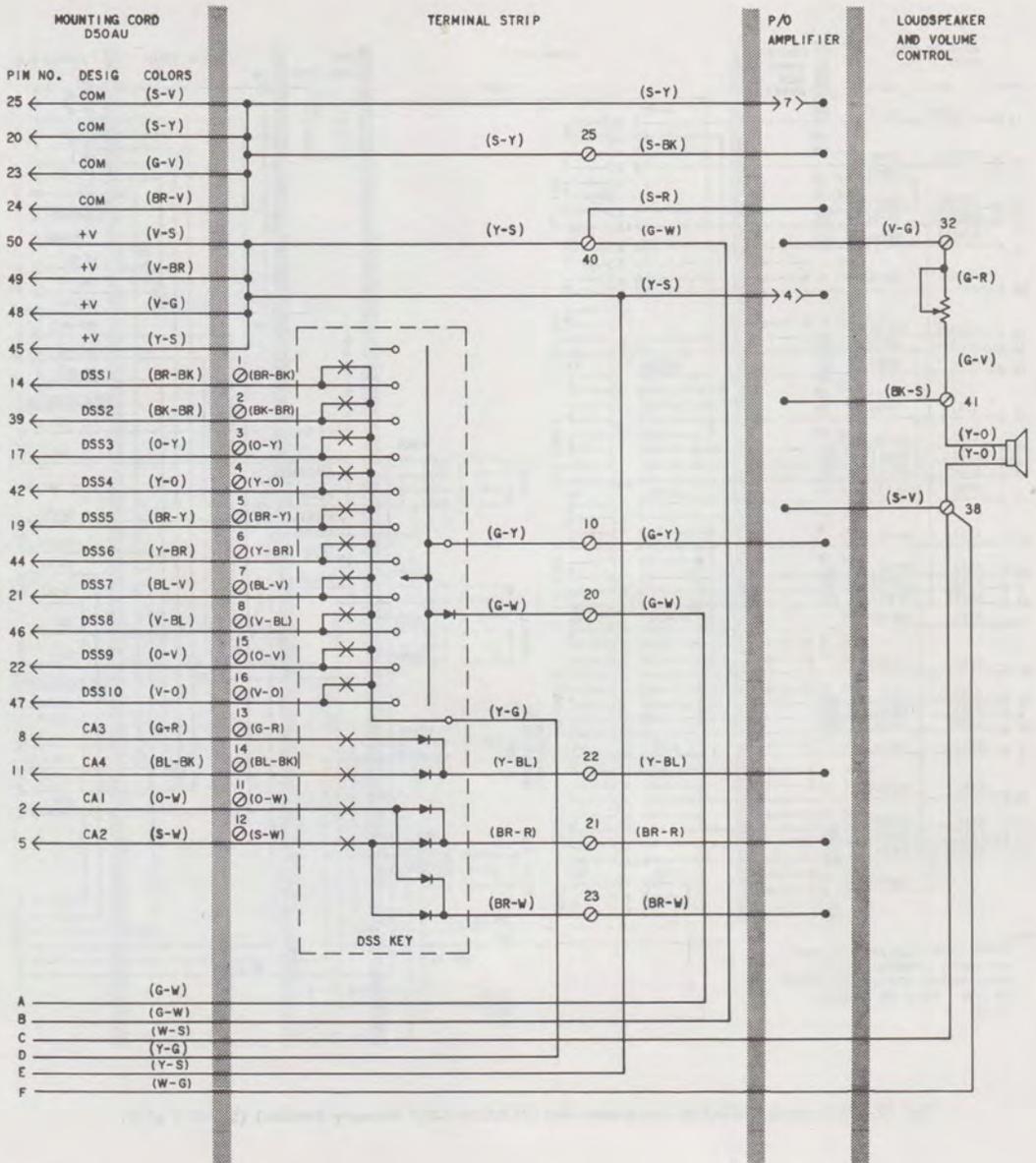


Fig. 16—Schematic, 837AM Telephone Set (Rotary Satellite Station) (Sheet 2 of 2)

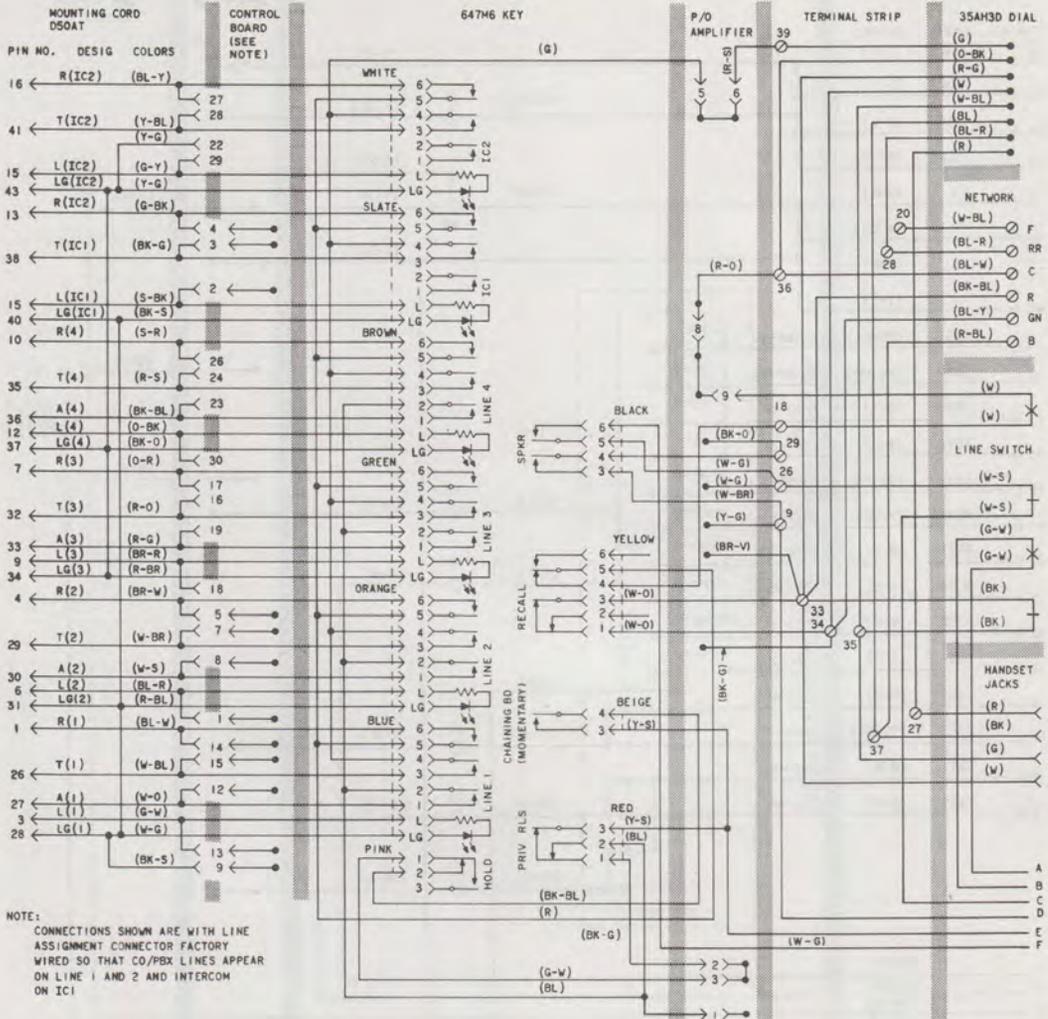


Fig. 17—Schematic, 2836AM Telephone Set (TOUCH-TONE Primary Station) (Sheet 1 of 2)

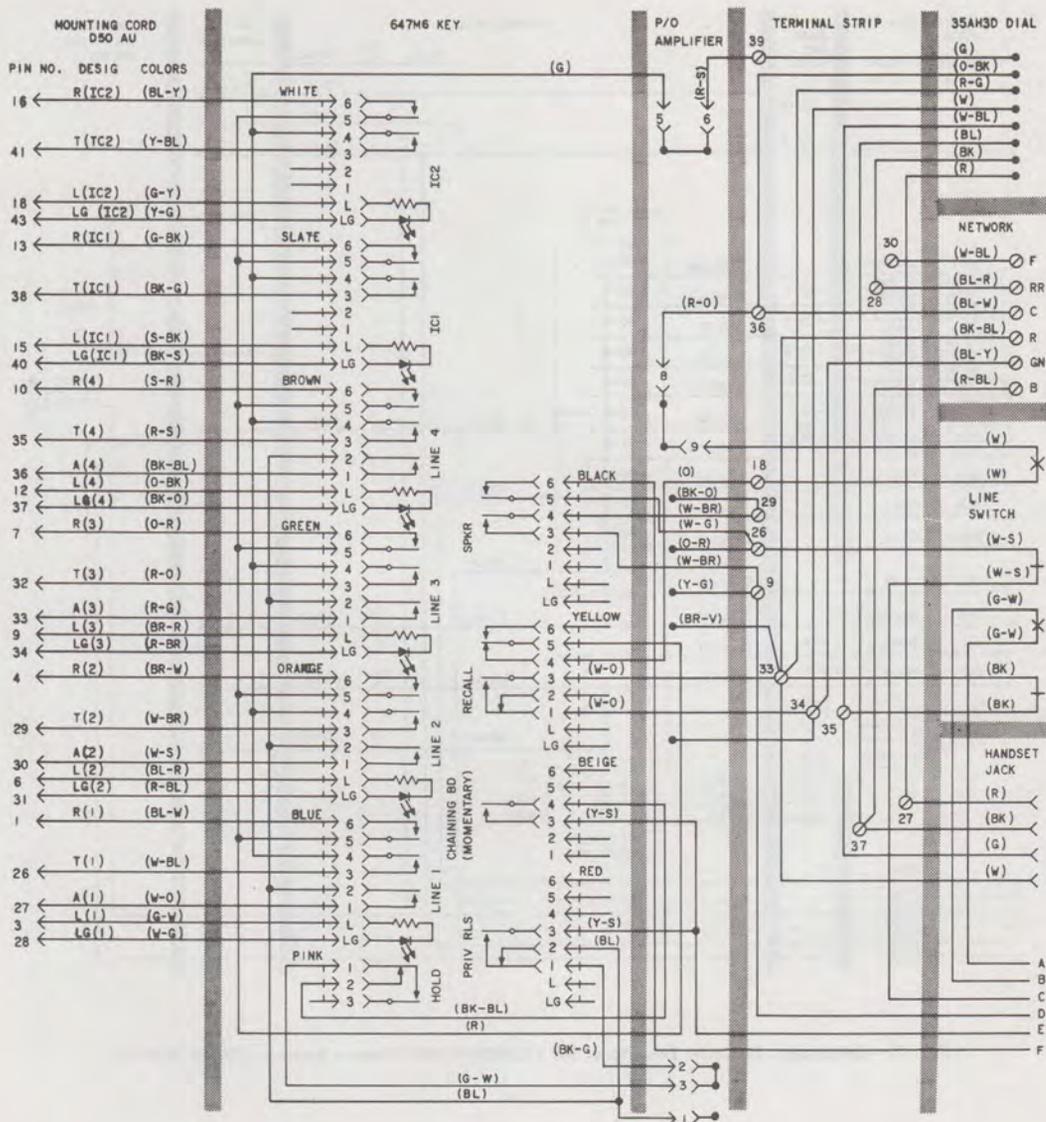


Fig. 18—Schematic, 2837AM Telephone Set (TOUCH-TONE Satellite Station (Sheet 1 of 2))

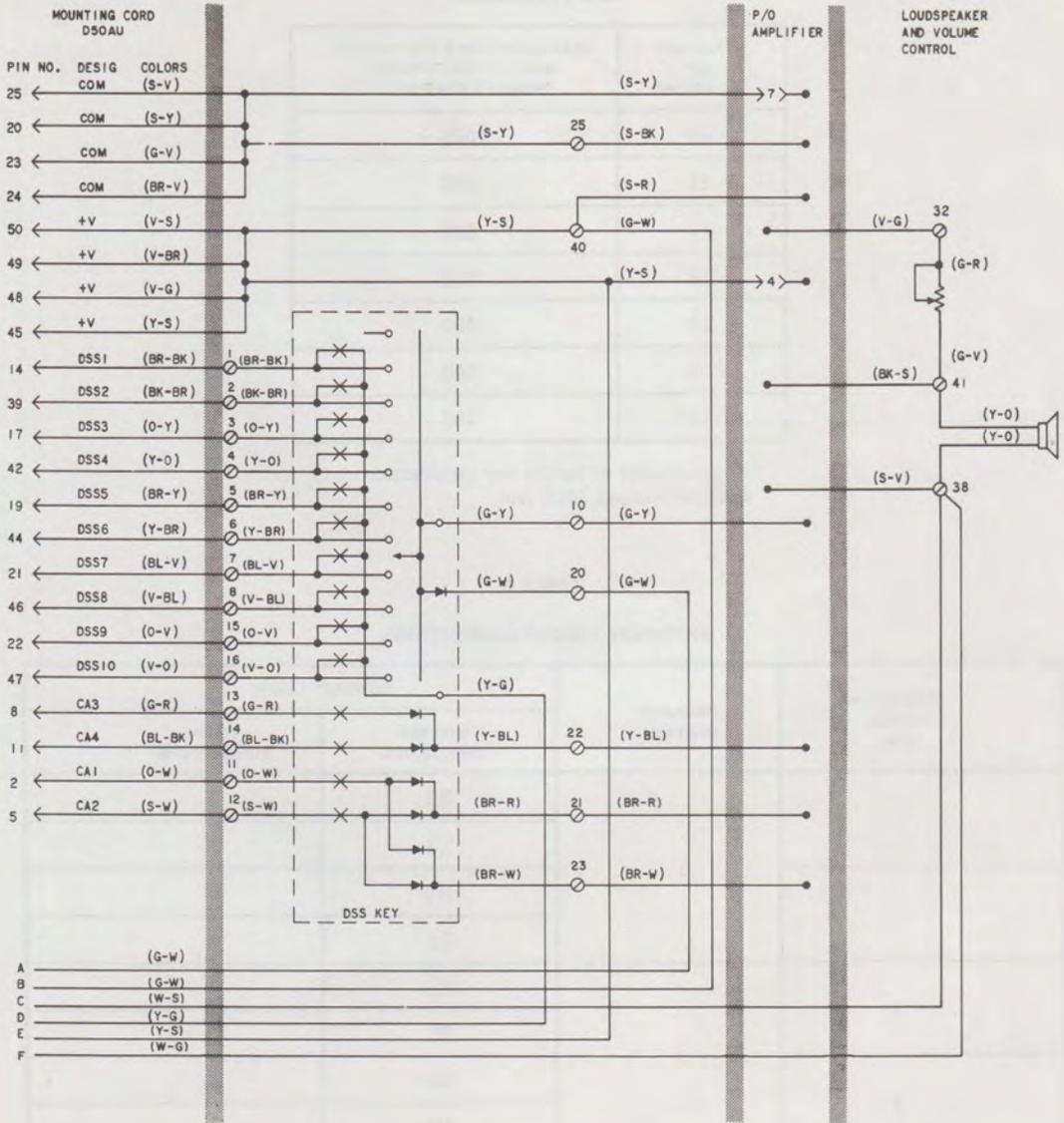


Fig. 18—Schematic, 2837AM Telephone Set (TOUCH-TONE) Satellite Station (Sheet 2 of 2)

TABLE A

LIMITATIONS ON CABLE LENGTH
AND SYSTEM SIZE

NUMBER OF STATIONS	MAXIMUM CABLE FEET FROM SATELLITES TO BOTH PRIMARY STATIONS*
10	1000
11	900
12	800
13	700
14	600
15	500
16	400

*Total number of feet in any installation shall not exceed 2000 feet.

TABLE B

EXTERNAL RINGER CONNECTIONS

RINGER ON CO/PBX LINE	PRIMARY STATION	CONNECT LEADS	
		FROM 91A CONN. BLOCK	TO E1C RINGER TERM.
1	1	R1	5
		T1	6
2		R2	5
		T2	6
3	2	R1	5
		T1	6
4		R2	5
		T2	6

Note: Use inside wire to make connections.

TABLE C

33A VOICE COUPLER CONNECTIONS

33A VOICE COUPLER	91A CONN. BLOCK	CUSTOMER-PROVIDED MUSIC SOURCE
1		†
2		†
3	M	
4	M	
G*		

*Connect to approved local ground using #14 gauge wire.

†Connections to be made by customer.

TABLE D

TO ADD PRIVACY OPTION

LEAD COLOR	REMOVE FROM	CONNECT TO
	AMPLIFIER TERMINAL	PRIVACY TERMINAL
BL	1	1
BK-G	2	2
G-W	3	3
Y-S	4	4
G	5	5
R-S	6	6
S-Y	7	7
R-O	8	8
W	9	9

TABLE E

CO/PBX LINE CONNECTIONS

LEAD DESIG.	AT 1st PRIMARY STATION	AT 2nd PRIMARY STATION
	91A CONN. BLOCK	91A CONN. BLOCK
R(1)	R1	
T(1)	T1	
R(2)	R2	
T(2)	T2	
R(3)		R1
T(3)		T1
R(4)		R2
T(4)		T2

TABLE F
DIAGNOSTIC TABLE

TROUBLE	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
One set does not ring on specified line(s) but lamp flashes properly.	Common audible switches not set properly.	Set the four common audible switches for desired ringing at that station.
One set does not receive voice signal on DSS.	Station designation not coded properly on DSS key.	Check for correct position of slide switch. Be sure switch is properly engaged in a detent (centered on number).
Low volume on ringing or voice signaling.	Volume control set too low. Handset off-hook.	Readjust volume. Replace handset.
One lamp does not light on one station but lights on other stations.	Lamp failure.	Replace lamp per 6.12.
A lamp does not light at any station and there is an audible buzz on the line associated with lamp.	Lamp pair shorted in a station or transposed on a connecting block.	Correct wiring.
No music-on-hold.	Blown fuse on 33A voice coupler, improper wiring of music-on-hold option.	Replace fuse. Check wiring of music-on-hold circuit board and 33A coupler.
Excessive crosstalk on lines 1 and 2 or 3 and 4 when on hold.	Improper installation of music-on-hold option.	<ol style="list-style-type: none"> 1. Check wiring of 33A coupler. 2. Music-on-hold board installed in a set, but option not being furnished.
Music distorted or too low.	Improper adjustment of music level; customer's music source does not have sufficient output.	See 3.12, 3.13, and 3.14.
Cannot drop a particular line at any station.	Failure of primary set logic circuit.	Replace primary set.
False hold condition when changing lines or lightly touching line buttons.	Defective line key.	Replace line key per 6.09.

TABLE F (Cont)
DIAGNOSTIC TABLE

TROUBLE	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
No sidetone on CO/PBX line.	Incoming CO/PBX line is dead.	Check incoming tip and ring with test set.
	Incoming tip and ring terminated on wrong terminals.	Check connections.
	Switch pileup on telephone set is defective.	Change out telephone set.
	Privacy circuit (if set is so equipped) may be operating incorrectly.	Check to see if privacy relay is falsely operating when going off-hook. If yes, check connections. If okay, replace privacy circuit.
	If rotary dial set has dial restriction.	BL-R lead of telephone set not moved from terminal 28 to 39.
	If 66-type connecting blocks are used, the cutdown may be incorrect.	Check station cutdown.
All four CO/PBX lamps light dim; noise on intercom on all sets.	Set has privacy circuit and CO/PBX line is in use by another station.	No corrective action; wait until line is not in use.
	System power supply shorted.	Disconnect sets (one at a time). If problem persists, check cable.
Sidetone on CO/PBX lines; but no lamps on CO/PBX or intercom lines, no ringing on above lines, no intercom talk battery. Transformer usually warm.	No power applied to associated control set.	Verify power at ac outlet and ensure that sets are plugged in.
	Power supply was shorted long enough to permit thermal cutout in transformer to operate.	<ol style="list-style-type: none"> 1. Replace transformer. 2. Replace primary set. 3. Wait (up to 30 minutes) for thermal circuit breaker to reset automatically.
Cannot dial.	Set wired for dial restriction option.	No corrective action necessary.
Noise from speaker as volume control is rotated.	Defective volume control.	Replace assembly as covered in 6.13.

TABLE F (Cont)

DIAGNOSTIC TABLE

TROUBLE	POSSIBLE CAUSES	POSSIBLE SOLUTIONS
Privacy circuit does not prevent pickup when going off-hook on a busy line.	Improperly wired or defective privacy circuit.	Correct wiring or replace privacy circuit.
Privacy circuit does not prevent pickup on busy line when rapidly changing lines, but is okay going off-hook.	Defective line key.	Replace line key.